



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/812,155	03/29/2004	Keisuke Inoue	SCEI 3.0-200	2941
530 7590 06/13/2007 LERNER, DAVID, LITTENBERG, KRUMHOLZ & MENTLIK 600 SOUTH AVENUE WEST WESTFIELD, NJ 07090			EXAMINER STOYNOV, STEFAN	
			ART UNIT 2116	PAPER NUMBER
			MAIL DATE 06/13/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/812,155	Applicant(s) INOUE, KEISUKE	
	Examiner Stefan Stoynov	Art Unit 2116	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 March 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 15-19 and 37-51 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 15-19 and 37-51 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 15-17, 37-39, and 42-43 are rejected under 35 U.S.C. 102(e) as being anticipated by Greene, US Patent No. 6,775,787. Greene shows the claim limitations in Figures 1-4.

Regarding claims 15 and 37, Greene discloses a processing system for processing operations associated with thermal attributes and a processing apparatus for processing operations, comprising:

a first operation having a first thermal attribute exceeding an operating threshold (column 6, lines 52-57, column 6, line 61 – column 7, line 7, lines 32-36, column 8, lines 34-49);

a second operation, having a second thermal attribute not exceeding an operating threshold (column 6, lines 52-57, column 6, line 61 – column 7, line 7, lines 32-36, lines 43-63); and

a processor for executing the first and the second operations (column 3, line 64 – column 4, line 5, FIG. 2), the processor having a thermal threshold (column 5, line 65 – column 6, line 15, column 7, lines 32-36);

Art Unit: 2116

wherein, if the thermal threshold of the processor is not exceeded, the processor selects the first operation for processing (column 7, lines 43-63, column 8, lines 20-43), and

if the thermal threshold of the processor is exceeded, the processor selects the second operation for processing (column 8, line 44 – column 9, line 20).

Regarding claims 16 and 38, Greene further discloses the system and apparatus, wherein, if the thermal threshold is not exceeded, and if the first operation is not available, then the processor is operable to obtain and execute the second operation (column 7, line 63 – column 8, line 13).

Regarding claims 17 and 39, Greene further discloses the system and apparatus as per claims 16 and 38, wherein, if the second operation is not available, then the processor is operable to idle for a predetermined period of time (column 8, lines 14-19).

Regarding claim 42, Greene further discloses the apparatus, wherein the processor comprises a sub-processing unit, and the sub-processing unit includes a floating point unit, and integer unit and a register associated with the floating point unit and the integer unit (column 4, line 62 – column 5, line 4).

Regarding claim 43, Greene further discloses the apparatus as per claim 42, wherein the sub-processing unit further includes a local store (column 5, lines 4-11).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 18, 19, 40, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Greene, US Patent No. 6,775,787 in view of Sunakawa et al. US Patent No. 5,828,568. Sunakawa shows the claim limitations in Figures 1-26).

Regarding claims 18 and 40, Greene discloses the system and apparatus as per claims 15 and 37, respectively.

Greene fails to disclose a plurality of priority queues, each of the priority queues including a first queue and a second queue, the first queues for storing the first operation and the second queues for storing the second operation.

Sunakawa teaches a plurality of queues with different priority levels, queuing tasks, further used for scheduling the task execution (column 9, lines 35-37, lines 40-53). In Sunakawa, the above-described apparatus and method, similar to applicant's invention, provide for changing the execution priority of a task in correspondence with the consumption power of a device used by the task. Therefore, as the device requires a larger consumption power, it can enter power-savings control earlier (column 11, lines 26-30). Thus, the overall consumption power is saved without lowering operability column 11, line 30-32).

Art Unit: 2116

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to use the plurality of priority queues, storing tasks for further execution in consideration with the device power consumption, as suggested by Sunakawa with the system and apparatus disclosed by Greene in order to implement a plurality of priority queues, each of the priority queues including a first queue and a second queue, the first queues for storing the first operation and the second queues for storing the second operation. One of ordinary skill in the art would be motivated to do so in order to save the overall power consumption without lowering the system operability.

Regarding claims 19 and 41, Sunakawa further teaches the system an apparatus as per claims 18 and 40, respectively, wherein a first one of the priority queues is a high priority queue, a second one of the priority queues is a medium priority queue, and a third one of the priority queues is a low priority queue (column 9, lines 40-47, FIG. 6).

Claims 44-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Greene, US Patent No. 6,775,787 in view of Gschwind et al., US Patent No. 6,948,082. Gschwind shows the claim limitations in Figures 1-6.

Regarding claims 44 and 47-49, Greene discloses the system and apparatus as per claims 15 and 37, respectively.

With regards to claims 44 and 48, Greene fails to disclose the first and the second thermal attributes are based on a power density of the processor.

With regards to claims 47 and 49, Greene fails to disclose the first and the second thermal attributes are bases on an amount of heat generated over a period of time by the processor.

Gschwind teaches a method and apparatus for power and thermal management employing hardware and software components similar to applicant's invention (column 1, lines 10-14). Gschwind further teaches based on power (thermal) indications, generating notification events causing the software algorithms and parameters to reduce the power of the system (column 4, lines 41-45). In addition, Gschwind further teaches the notification events containing information about particular chip regions that have reached or exceeded a certain thermal threshold (column 5, 22-30). Thus, due to increased power density (column 1, lines 49-53), the software controls the resources for proper thermal management (column 5, lines 22-44). Furthermore, Gschwind teaches the power control implementing a time-out mechanism operating in conjunction with the thermal thresholds to enter or exit the power-optimized state (column 6, lines 6-21). Thus, the power control is based on comparing the accumulated heat in the microprocessor during the time-out period with predetermined thermal thresholds. In Gschwind, the integration of software allows for using the system behavior to aid the thermal management (column 2, lines 51-54). Thus, random reduction in the system performance due to increased temperature is avoided (column 2, lines 45-50).

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to use the above described method and apparatus, as suggested by Gschwind with the system and apparatus disclosed by Greene in order to implement the first and the second thermal attributes are based on a power density of the processor and the first and the second thermal attributes are based on an amount of heat generated over a period of time by the processor. One of ordinary skill in the art would be motivated to do so in order to prevent random reductions in the system performance due to increased operating temperature.

Art Unit: 2116

Regarding claim 45, Gschwind further teaches the system as per claim 44, wherein the processor includes a plurality of subcomponents, and the power density is based on a physically related group of the subcomponents (power density based on subcomponents corresponding to chip regions within the microprocessor – column 5, lines 22-25).

Regarding claim 46, Gschwind further teaches the system as per claim 44, wherein the processor includes a plurality of subcomponents, and the power density is based on a logically related group of the subcomponents (power density based on subcomponents corresponding to chip regions within the system-on-a-chip – column 5, lines 22-25).

Regarding claims 50 and 51, Greene discloses the system and apparatus as per claim 42.

Greene fails to disclose the first and the second thermal attributes are based on a power density of the processor. In addition, with respect to claim 50, Greene fails to disclose the power density is based on a physically related group of one or more of the floating point unit, the integer unit and the register. Similarly, with respect to claim 51, Greene fails to disclose the power density is based on a logically related group of one or more of the floating point unit, the integer unit and the register.

Gschwind teaches a method and apparatus for power and thermal management employing hardware and software components similar to applicant's invention (column 1, lines 10-14). Gschwind further teaches based on power (thermal) indications, generating notification events causing the software algorithms and parameters to reduce the power of the system (column 4, lines 41-45). In addition, Gschwind further teaches the notification events containing information about particular chip regions that have reached or exceeded a certain thermal threshold (column 5, 22-30). Thus, due to increased power density (column 1,

Art Unit: 2116

lines 49-53), the software controls the resources for proper thermal management (column 5, lines 22-44). In addition, Gschwind teaches implementing the power regulation based on the chip power density for the floating point unit integrated within the microprocessor or within the system-on-a-chip (i.e. either part of a physically or logically related group – column 5, lines 22-30). . In Gschwind, the integration of software allows for using the system behavior to aid the thermal management (column 2, lines 51-54). Thus, random reduction is the system performance due to increased temperature is avoided (column 2, lines 45-50).

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to use the above described method and apparatus, as suggested by Gschwind with the system and apparatus disclosed by Greene in order to implement the first and the second thermal attributes are based on a power density of the processor, the power density is based on a physically related group of one or more of the floating point unit, the integer unit and the register, and the power density is based on a logically related group of one or more of the floating point unit, the integer unit and the register. One of ordinary skill in the art would be motivated to do so in order to prevent random reductions in the system performance due to increased operating temperature.

Response to Arguments

Applicant's arguments filed 03/27/2007 have been fully considered but they are not persuasive.

The applicant' argued in essence that the power estimation utilizing power values associated with different instruction types and adjusting the power according to power thresholds by scheduling for execution (or not executing) certain instruction in the Greene

Art Unit: 2116

reference are different than the claimed thermal attributes. More specifically, that the power above mentioned power thresholds and the maximum power dissipation are different than the claimed thermal thresholds and based on the heat generated by the component during execution of different operations.

The examiner respectfully disagrees. It is well known in the art that there is direct correlation between power consumption, power dissipation (measured by various methods including counting the number of executed instruction – i.e. different power dissipation by different operations consisting of different type or number of instructions), and heat or temperature dissipation, as evidenced by Gschwind et al., US Patent No. 6,948,082 (column 3, lines 37-53, column 9, lines 9-14). Accordingly, independent claims 15 and 37 and all claims dependent on claims 15 and 37 stand rejected, as indicated in this Office action.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.


Art Unit: 2116

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stefan Stoykov whose telephone number is (571) 272-4236. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rehana Perveen can be reached on (571) 272-3676. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SS


REHANA PERVEEN
SUPERVISORY PATENT EXAMINER
6/6/07